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10/038,782	12/31/2001	Roger E. Frech	OU 3721.1	4101

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SENNIGER POWERS LEAVITT AND ROEDEL
ONE METROPOLITAN SQUARE
16TH FLOOR
ST LOUIS, MO 63102

EXAMINER	
CANTELMO, GREGG	
ART UNIT	**PAPER NUMBER**
1745	7

DATE MAILED: 10/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/038,782	Applicant(s) FRECH ET AL.
	Examiner Gregg Cantelmo	Art Unit 1745

-- The MAILING DATE of this communication appears on the cover sheet with the c rrespondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-73 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-73 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 31 December 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3, 5, 6 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Priority

1. Applicant's claim to U.S. provisional Application Serial No. 60/258,754 filed December 29, 2000 is acknowledged.

Information Disclosure Statement

2. The information disclosure statements filed April 2, 2002, April 12, 2002, and August 7, 2003 have been placed in the application file and the information referred to therein has been considered as to the merits.

3. Duplicate citations listed on the supplemental information disclosure statements have been crossed out.

Drawings

4. The drawings received December 31, 2001 are acceptable for examination purposes.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 4-10, 30-32, 34, 37-39, 49 and 53-73 are rejected under 35 U.S.C. 102(b) as being anticipated by C. Harris et al. "Ionic Conductivity in Branched Polyethylenimine ... Complexes" (hereafter referred to as Harris).

Harris discloses a covalently crossed-linked polymer electrolyte (abstract) comprising amine groups (polyethyleneimine) (PEI) in the polymer backbone and a dissolved or dispersed metal salt therein (abstract and page 1778 as applied to claim 1).

The prior art composition is identical to the instant claimed composition. Thus there is a reasonable expectation that the prior art composition has the same conductivity (as applied to claim 4).

The electrolyte comprises cross-linked linear or branched PEI (title and page 1778 as applied to claims 5-9, 31).

In using PEI the repeating unit as recited in claim 10 is present in the combined polymer (as applied to claim 10).

The PEI has a degree of elastomerism (as applied to claim 30).

The metal salt is an alkali metal salt (as applied to claims 32 and 34).

Harris teaches of the ratio of primary, secondary and tertiary amines (and thus nitrogen's) on page 1780 (as applied to claims 37 and 38).

The ratio of heteroatoms to metal ions from the salt is 6:1, 12:1 and 20:1 (abstract as applied to claim 39).

The presence of the amine groups in the PEI will inherently form labile protons (as applied to claim 49).

The electrolyte above is disposed between stainless steel electrodes and thus is held to be a battery. The presence of the amine groups in the PEI will inherently form labile protons (pages 1778 and 1779 as applied to claims 53).

No patentable weight is accorded to the term "fuel cell" in the preamble since the body of the claim fails to recite any structure pertaining exclusively to fuel cells. The body merely recites battery components.

The electrolyte comprises cross-linked linear or branched PEI (title as applied to claims 54-56).

The electrolyte above is taught to be used in high-density batteries (page 1778) and further is disposed between electrodes (page 1779 as applied to claims 57 and 61).

The electrolyte comprises cross-linked linear or branched PEI (title as applied to claims 58-60 and 62-64).

Since the polymer has ionic conductivity as discussed throughout Harris and further is used in a battery arrangement as discussed above, the polymer/salt mixture must have an ion pair in order to have the requisite ionic conductivity. The metal salt constitutes the ion pair wherein one of the ions attaches to the polymer backbone and the other ion diffuses through the polymer electrolyte (as applied to claims 65, 66 and 70).

The electrolyte comprises cross-linked linear or branched PEI (title as applied to claims 67-69 and 71-73).

7. Claims 1, 4-5, 7, 8, 10, 30-32, 34, 37, 38, 49, 53, 54, 56-58, 60-62, 64-67, 69-71 and 73 are rejected under 35 U.S.C. 102(b) as being anticipated by T. Takahashi

"Chemical Modification of Poly(ethylene imine) for Polymeric electrolyte" (hereafter referred to as Takahashi).

Takahashi discloses a covalently crossed-linked polymer electrolyte (abstract) comprising amine groups (poly (ethyleneimine)) (PEI) in the polymer backbone and a dissolved or dispersed metal salt therein (abstract and page 321, first column, first paragraph as applied to claim 1).

The prior art composition is identical to the instant claimed composition. Thus there is a reasonable expectation that the prior art composition has the same conductivity (as applied to claim 4).

The electrolyte comprises cross-linked linear PEI (title as applied to claims 5, 7, 8, and 31).

In using PEI the repeating unit as recited in claim 10 is present in the combined polymer (as applied to claim 10).

The PEI has a degree of elastomerism (as applied to claim 30).

The metal salt is an alkali metal salt NaI (page 324 as applied to claims 32 and 34).

The presence of the amine groups in the PEI will inherently form labile protons (as applied to claim 49).

The electrolyte comprises cross-linked linear PEI (title as applied to claims 53, 54 and 56). The electrolyte above is disposed between stainless steel electrodes and thus is held to be a battery (page 322 under "Conductivity measurements" as applied to claims 53, 57 and 61). No patentable weight is accorded to the term "fuel cell" in the

preamble since the body of the claim fails to recite any structure pertaining exclusively to fuel cells. The body merely recites battery components (as applied to claim 53).

The electrolyte comprises cross-linked linear PEI (title as applied to claims 58, 60, 62 and 64).

Since the polymer has ionic conductivity as discussed throughout Takahashi and further is used in a battery arrangement as discussed above, the polymer/salt mixture must have an ion pair in order to have the requisite ionic conductivity. The metal salt NaI, constitutes the ion pair wherein one of the ions attaches to the polymer backbone and the other ion diffuses through the polymer electrolyte (as applied to claims 65, 66 and 70).

The electrolyte comprises cross-linked linear PEI (title as applied to claims 67, 69, 71 and 73).

8. Claims 1, 4-6, 8, 9, 10, 19-22, 25, 30-32, 34-35, 49-55, 57-59, 61-63, 65-68 and 70-72 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. patent No. 5,501,919 (Paul).

Paul discloses a polymer electrolyte (abstract) comprising a cross-linked PEI electrolyte in the polymer backbone and a dissolved or dispersed metal salt therein (abstract as applied to claim 1).

The film has a conductivity of at least about 10-4 S/cm at about 60° C (col. 3, ll. 14-16 as applied to claim 4).

The electrolyte comprises cross-linked branched PEI (title as applied to claims 5, 6, 8, 9, 31).

The repeating unit comprises -X-N- (note that the R substitutent is optional) wherein X is ethylene (col. 3, ll. 5-10 as applied to claim 10).

The plasticizer is a swelling solvent (col. 3, ll. 36-44 as applied to claims 19 and 25).

In the case of the plasticizer, it is added about 10-70% to the total electrolyte (col. 3, ll. 46-59 as applied to claims 20-22).

The polymer is an elastomer (col. 3, ll. 25-28 as applied to claim 30).

The metal salt is an alkali metal such as Li (col. 2, ll. 65-67 as applied to claims 32 and 34).

The lithium is obtained from LiCF3SO3 (col. 4, ll. 35 as applied to claim 35).

The presence of the amine groups in the PEI will inherently form labile protons (as applied to claim 49).

The ratio of nitrogen to labile protons is prorated to within the same ranges of claim 50 (paragraph bridging columns 2 and 3 as applied to claim 50).

The PEI and salt are mixed in water. Water being a species identified as a swelling agent in the instant claims. Absent clear evidence to the contrary, the water of Paul is held to be a swelling agent (col. 5, ll. 5-10 as applied to claims 51 and 52).

The system is disposed in a battery and thus the polymer is inherently in contact with an anode on one side of the polymer electrolyte and a cathode on the other side of the polymer electrolyte (as applied to claims 53, 57, 61 and 70). No patentable weight is accorded to the term "fuel cell or "gradient" in the preambles since the body of the claim fails to recite any structure pertaining exclusively to fuel cells or "gradient"

batteries. The body merely recites battery components (as applied to claims 53 and 61).

The electrolyte comprises cross-linked branched PEI (title as applied to claims 54, 55, 58, 59, 62, 63, 71 and 72).

The polymer/salt mixture must have an ion pair in order to have the requisite ionic conductivity. The metal salt, constitutes the ion pair wherein one of the ions attaches to the polymer backbone and the other ion diffuses through the polymer electrolyte (as applied to claim 65 and 66).

The electrolyte comprises cross-linked branched PEI (title as applied to claims 67 and 68).

9. Claims 1, 5-6, 8, 9, 10-14, 16-19, 23-26, 29-36, 40-49, 53-55, 57-59, 61-63, 65-68 and 70-72 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. patent No. 5,648,186 (Gao).

Gao discloses a cross-linked polymer electrolyte comprising amine groups in the polymer backbone and a dissolved or dispersed metal salt therein (abstract, col. 7, ll. 16-35 and col. 8, ll. 29-41 as applied to claim 1).

The film has a conductivity of at least about 10-4 S/cm at about 60° C (col. 3, ll. 14-16 as applied to claim 4).

The electrolyte comprises cross-linked branched PEI (col. 7, ll. 16-32 as applied to claims 5, 6, 8, and 9).

The repeating unit comprises -X-N- (note that the R substitutent is optional) wherein X is ethylene (col. 7, ll. 16-32 as applied to claim 10).

The polymer is a copolymer of PEI and PEO (col. 7, ll. 16-32 as applied to claims 11, 12,

The electrolyte comprises cross-linked branched PEI (col. 7, ll. 16-32 as applied to claims 13-14).

The repeating unit comprises -X-N- and -Y- (note that the R substitutent is optional) wherein X is ethylene and Y is PEO (col. 7, ll. 16-32 as applied to claims 16 and 18).

The copolymer is a block (col. 6, ll. 16-20 as applied to claim 17).

Daroux teaches that various plasticizer/swelling solvent materials include methylformate, dimethylsulfoixde, polyethylene glycol, glymes and propylene carbonate are known to be used in the polymer electrolyte (col. 8, ll. 9-28 as applied to claims 19, 23-26 and 29).

Daroux teaches that any of these materials can be used to produce the electrolyte for the purpose of enhancing the solubility of the salt in the polymeric electrolyte and enhanced the conductivity of the electrolyte (col. 8, ll. 15-20).

PEI is an elastomeric material (as applied to claim 30).

The cross-linking occurs between the amine groups (col. 5, ll. 43-57 and col. 8, ll. 29-40 as applied to claim 31).

The metal salt includes transition metals, alkali metals and alkaline earth metals (col. 13, ll. 31-38 as applied to claims 32-36).

The polymer electrolyte comprises amine groups in the polymer electrolyte and solvents including methylformate, dimethylsulfoixde, polyethylene glycol, glymes and

propylene carbonate are known to be used in the polymer electrolyte (citation locations discussed above as applied to claims 40 and 43).

The electrolyte comprises cross-linked branched PEI (col. 7, ll. 16-32 as applied to claims 41 and 42).

The repeating unit as recited in claim 44 is present in the combined polymer PEI/PEO and plasticizing solvent (as applied to claim 44).

The solvent is solvents including methylformate, dimethylsulfoixde, polyethylene glycol, glymes and propylene carbonate (as discussed above and applied to claims 45 and 46).

The metal salt includes transition metals, alkali metals and alkaline earth metals (col. 13, ll. 31-38 as applied to claims 47-48).

The presence of the amine groups in the PEI will inherently form labile protons (as applied to claim 49).

The electrolyte comprises cross-linked linear or branched PEI (title as applied to claims 53-56). The electrolyte above is disposed in a battery (col. 14, ll. 10-26 as applied to claims 53, 57 and 61). No patentable weight is accorded to the term "fuel cell" in the preamble since the body of the claim fails to recite any structure pertaining exclusively to fuel cells. The body merely recites battery components (as applied to claim 53).

The electrolyte comprises cross-linked linear PEI (title as applied to claims 58, 60, 62 and 64).

Since the polymer has ionic conductivity as discussed throughout Gao and further is used in a battery arrangement as discussed above, the polymer/salt mixture must have an ion pair in order to have the requisite ionic conductivity. The metal salt NaI, constitutes the ion pair wherein one of the ions attaches to the polymer backbone and the other ion diffuses through the polymer electrolyte (as applied to claims 65, 66 and 70).

The electrolyte comprises cross-linked linear PEI (as applied to claims 67, 69, 71 and 73).

10. Claims 1, 2, 5, 8, 10-15, 19, 23-26, 29-32, 34, 35, 40-49, 53, 54, 57, 58, 61, 62, 65-67, 70 and 71 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. patent No. 5,419,984 (Chaloner-Gill).

Chaloner-Gill discloses a covalently cross-linked polymer electrolyte comprising amine groups (PEI) in the polymer backbone and a dissolver or dispersed metal salt therein (abstract, col. 3, ll. 28-34; col. 5, ll. 41-47 as applied to claim 1).

The film thickness is about 25-100 microns (col. 7, ll. 47-48 as applied to claim 2).

The polymer comprises PEI (col. 3, ll. 28-34) which is inherently one of branched or linear and substituted or unsubstituted (as applied to claims 5 and 8).

In using PEI the repeating unit as recited in claim 10 is present in the combined polymer (as applied to claim 10).

The polymer is a copolymer of PEI and polysiloxane acrylates (abstract col. 3, ll. 28-34; col. 5, ll. 41-47 as applied to claim 11).

The backbone will have two or more different repeating units due to the presence of different polymers in the copolymer backbone (as applied to claim 12).

X is ethylene when using PEI (as applied to claim 13).

The polymer comprises PEI (col. 3, ll. 28-34) which is inherently one of branched or linear and substituted or unsubstituted (as applied to claim 14).

The copolymer is random or block (col. 7, ll. 66-67 as applied to claim 15).

The polymer is swollen with a plasticizer (col. 1, ll. 45-61 as applied to claims 19 and 25).

The plasticizer can be propylene carbonate, tetrahydrofuran, glyme, dimethylsulfoxide, dioxolane, sulfolane and the like (col. 1, ll. 56-61 as applied to claims 23, 24, 25, 26 and 29).

The polymer is elastomeric (col. 4, ll. 22-25 as applied to claim 30).

The amine group of the PEI will covalently link to the polysiloxane acrylates (as applied to claim 31).

The metal salt is one of transition metals, alkali metals and alkaline earth metals ((col. 5, ll. 47-59 as applied to claim 32, 34 and 35).

The covalently cross-linked polymer electrolyte of PEI and polysiloxane acrylate comprises amine groups in the polymer backbone and the plasticizer solvent is bound to the polymer (abstract col. 3, ll. 28-34; col. 5, ll. 41-47, col. 1, ll. 56-61 as applied to claims 40 and 43).

The polymer comprises PEI (col. 3, ll. 28-34) which is inherently one of branched or linear and substituted or unsubstituted (as applied to claim 41 and 42).

The combination of the PEI cross-linked to the polysiloxane acrylate and further in the presence of the disclosed particular plasticizers will result in a product having the same general repeat formula expressed in claim 44.

The solvent moiety can be propylene carbonate, tetrahydrofuran, glyme, dimethylsulfoxide, dioxolane, sulfolane and the like (col. 1, ll. 56-61 as applied to claims 45 and 46).

The metal salt is one of transition metals, alkali metals and alkaline earth metals ((col. 5, ll. 47-59 as applied to claims 47 and 48).

The presence of the amine groups in the PEI will inherently form labile protons (as applied to claim 49).

The electrolyte comprises cross-linked PEI. The electrolyte above is disposed in a battery (col. 14, ll. 10-26 as applied to claims 53, 57 and 61). No patentable weight is accorded to the term "fuel cell" in the preamble since the body of the claim fails to recite any structure pertaining exclusively to fuel cells. The body merely recites battery components (as applied to claim 53).

The polymer comprises PEI (col. 3, ll. 28-34) which is inherently one of branched or linear and substituted or unsubstituted (as applied to claims 54 and 58 and 62).

Since the polymer has ionic conductivity and further is used in a battery arrangement as discussed above, the polymer/salt mixture must have an ion pair in order to have the requisite ionic conductivity. The metal salt, constitutes the ion pair wherein one of the ions attaches to the polymer backbone and the other ion diffuses through the polymer electrolyte (as applied to claims 65, 66 and 70).

The polymer comprises PEI (col. 3, ll. 28-34) which is inherently one of branched or linear and substituted or unsubstituted (as applied to claims 67 and 71).

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Harris or Takahashi in view of U.S. patent No. 5,643,665 (Saidi).

Each of Harris, Paul and Takahashi are taught to inherently have the property recited in claim 3 as directed to claim 4 above, incorporated herein.

The teachings of claim 1 with respect to each of Harris, Paul and Takahashi have been discussed above and are incorporated herein.

The difference between instant claim 2 and each of Harris, Paul or Takahashi is that none of these references teach of the thickness of the polymer electrolyte film.

Saidi teaches that PEI electrolyte thickness of (col. 1, ll. 50-67 and prior art claim 1 as applied to claim 2).

If the electrolyte is too thin, the mechanical strength of the polymer is adversely affected. If the electrolyte is too thick, conductivity is adversely affected. Thus one of ordinary skill in the art would recognize that particular thickness selection is dependent

upon optimization of both the mechanical properties and ionic properties of the polymer electrolyte.

The motivation for selecting a polymer electrolyte thickness to be between about 50 microns is that it reduces the size of the battery while optimizing the conductivity and mechanical strength of the polymer electrolyte.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of either Harris, Paul or Takahashi by selecting a polymer electrolyte thickness to be between about 50 microns since it would have reduced the size of the battery while having optimized the conductivity and mechanical strength of the polymer electrolyte.

13. Claims 23, 24, 26 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. patent No. 5,501,919 (Paul) in view of U.S. patent No. 5,648,186 (Daroux).

The teachings of claims 1, 19 and 25 have been discussed above and are incorporated herein.

The differences not yet discussed are of the particular plasticizers in claims 23, 24, 26 and 29.

As evident from the teachings of Paul, it is known to provide a plasticizer in the PEI polymer electrolyte. The presence of a plasticizer enables solvating of the metal ions in the electrolyte and increase the salt concentration in the polymer (col. 3, ll. 37-40 and 46-48).

Daroux teaches that various plasticizer materials including polyethylene glycol, glymes and propylene carbonate are known to be used in the polymer electrolyte (col. 8, ll. 9-28 as applied to claims 23, 24, 26 and 29).

Daroux teaches that any of these materials can be used to produce the electrolyte for the purpose of enhancing the solubility of the salt in the polymeric electrolyte and enhanced the conductivity of the electrolyte (col. 8, ll. 15-20).

The motivation for selecting either polyethylene glycol, glymes or propylene carbonate is that they all enhance the solubility of the salt in the polymeric electrolyte and enhance the conductivity of the electrolyte and as shown by Daroux are equivalent materials for such purposes.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Paul by selecting either polyethylene glycol, glymes or propylene carbonate since they would have each enhanced the solubility of the salt in the polymeric electrolyte and enhanced the conductivity of the electrolyte and as shown by Daroux are equivalent materials for such purposes. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945) See also In re Leshin, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

14. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gao in view of U.S. patent No. 5,300,374 (Agrawal).

The teachings of claims 1 and 10-14 have been discussed above and are incorporated herein.

The difference not yet discussed is of the polymer being a random polymer.

Use of random and block copolymers in solid electrolytes are known as taught by Agrawal (col. 1, ll. 58-65).

Agrawal teaches that both block and random copolymer arrays are known for their ability to suppress crystallization of the polymer.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Gao in view of Agrawal by using either a block or random copolymer since they have both been shown to suppress the crystallization of the polymer. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945) See also In re Leshin, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

15. Claims 23, 26 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. patent No. 5,501,919 (Paul) in view of U.S. patent No. 6,096,453 (Grunwald).

The teachings of claims 1, 19 and 25 have been discussed above and are incorporated herein.

The differences not yet discussed are of the particular plasticizers in claims 23, 24, 26 28 and 29.

As evident from the teachings of Paul, it is known to provide a plasticizer in the PEI polymer electrolyte. The presence of a plasticizer enables solvating of the metal ions in the electrolyte and increase the salt concentration in the polymer (col. 3, ll. 37-40 and 46-48).

Grunwald teaches that various plasticizer materials including polyethylene glycol, dibutyl phthalate and propylene carbonate are known to be used in the polymer electrolyte (col. 8, ll. 9-28 as applied to claims 23, 24, 26 and 29).

Daroux teaches that any of these materials can be used to produce the electrolyte for the purpose of enhancing the solubility of the salt in the polymeric electrolyte and enhanced the conductivity of the electrolyte (col. 8, ll. 15-20).

The motivation for selecting either polyethylene glycol, glymes or propylene carbonate is that they all enhance the solubility of the salt in the polymeric electrolyte and enhance the conductivity of the electrolyte and as shown by Daroux are equivalent materials for such purposes.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Paul by selecting either polyethylene glycol, glymes or propylene carbonate since they would have each enhanced the solubility of the salt in the polymeric electrolyte and enhanced the conductivity of the electrolyte and as shown by Daroux are equivalent materials for such purposes. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in Sinclair & Carroll Co. v.

Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945) See also In re Leshin, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

16. Claims 20-22 and 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. patent No. 5,501,919 (Paul) in view of U.S. patent No. 5,964,903 (Gao).

The teachings of claims 1, 19 and 25 have been discussed above and are incorporated herein.

The differences not yet discussed are of the weight of the solvent in the electrolyte mixture (claims 20-22) and of the particular solvents/plasticizers in claims 26-29.

With respect to the weight of the solvent (claims 20-22):

Gao teaches that the weight ratio of the plasticizer is from about 1-50 wt. %, more preferably about 10-30 wt. % (col. 4, ll. 1-17 as applied to claims 20 and 21). 1 wt. % and about 10 wt. % constitute data points which fall within the range of claim 22.

The motivation for providing the plasticizer in the weight ratio of Gao is that it enhances the degree of absorption of the salt in the polymer electrolyte.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Paul by selecting the weight of the solvent to be within the ranges taught by Gao since it would have enhanced the degree of absorption of the salt in the polymer electrolyte.

With respect to the particular solvents/plasticizers (claims 26-29):

As evident from the teachings of Paul, it is known to provide a plasticizer in the PEI polymer electrolyte. The presence of a plasticizer enables solvating of the metal ions in the electrolyte and increase the salt concentration in the polymer (col. 3, ll. 37-40 and 46-48).

Gao teaches that plasticizers comprise 2-(2-ethoxyethoxy) ethyl acetate, dimethyl adipate, dibutyl phthalate, propylene carbonate, and mixtures thereof (abstract as applied to claims 26-29).

The motivation for selecting the plasticizers of Gao is that it can improve the solubility of the salt while be easily removed from the polymer (col. 3, ll. 19-35).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Paul by selecting the plasticizers of Gao since it would have improved the solubility of the salt while being easily removed from the polymer. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945) See also In re Leshin, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

Conclusion

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is (703) 305-0635. The examiner can normally be reached on Monday through Thursday from 8:00

a.m. to 5:30 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan, can be reached on (703) 308-2383. FAX communications should be sent to the appropriate FAX number: (703) 872-9311 for After Final Responses only; (703) 872-9310 for all other responses. FAXES received after 4 p.m. will not be processed until the following business day. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Gregg Cantelmo
Patent Examiner
Art Unit 1745

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October 7, 2003